

# CALIFORNIA AGRICULTURAL RESOURCE DIRECTORY 2005



## **GLASSY-WINGED SHARPSHOOTER:**

*Winning Battles Today,  
Preparing for Threats Tomorrow*

## Acknowledgements

The California Department of Food and Agriculture is deeply grateful for the many individual and organizational contributions made to the Pierce's Disease Control Program. After five years the program has withstood the test of time, preventing spread of the glassy-winged sharpshooter and keeping the occurrence of Pierce's disease down to manageable levels. That being said, the battle is not yet won. We must continue to fight the fight as diligently as when the initial plan of action was developed.

### Thank you...

- Our Governor, representatives of the California Legislature and congressional delegates, who have had the wisdom to create the statutory authority and continue to recognize the critical funding needs of the program.
- United States Department of Agriculture, which recognized the significance of this problem early on and provided funding and technical expertise that contributed substantially to the program's success.
- County agricultural commissioners and their staffs, who have fought the battles at the local level and have stood shoulder to shoulder with the California Department of Food and Agriculture in support of the regulatory and response elements of the program.
- The agricultural industry, which has invested a significant amount of dollars in helping to prevent spread of the insect and supported research to find solutions. The nursery industry in particular has absorbed significant new costs to do its part in preventing spread of the sharpshooter.
- University of California, UC Cooperative Extension and California State University systems, which have conducted vital basic and applied research that will provide the building blocks needed to develop long-term solutions to Pierce's disease as well as the tools for short-term management of the insect and disease.
- And last but not least, our staff at the California Department of Food and Agriculture's Pierce's Disease Control Program, whose professionalism, dedication and technical expertise is responsible for building and maintaining an exemplary partnership that is now being used as a model for pest prevention programs nationwide.

The five-year story of the Pierce's Disease Control Program is a tribute to all of the agencies and individuals mentioned above. It has been a privilege and an honor to be a part of this exceptional and outstanding team.

Robert L. Wynn, Jr.  
Statewide Coordinator  
Pierce's Disease Control Program

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## GLASSY-WINGED SHARPSHOOTER: *Winning Battles Today, Preparing for Threats Tomorrow*

*Letter by*  
Governor Arnold Schwarzenegger

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## A Letter from Governor Arnold Schwarzenegger

### Dear Friends:

The Golden State is a vast and fertile land, and the American spirit of ingenuity has helped create the most sophisticated agricultural system in the nation. Agriculture is a bedrock industry in California that drives our powerful economy and supports more than one million jobs. Our 77,000 farms and ranches produce more than 350 crops and \$32 billion in direct farm sales.



California cultivates half of all the domestically produced fruits, nuts and vegetables consumed by Americans. Our hardworking farmers and ranchers make it possible for millions of people to eat nutritious, wholesome foods and enjoy a healthy lifestyle.

We are proud that our farming community remains committed to environmental stewardship and preserving a high quality of life in California.

As Governor, I am working faithfully to support innovative technologies that bring environmentally safe, affordable practices to agriculture and enhance the distribution of our products to the marketplace. Through the responsible management of our natural resources, the agricultural industry can help the nation meet its energy needs with increased production and biofuels.

We are working with policymakers, farmers, scientists and entrepreneurs across the state and country to promote forward-thinking cooperation and strengthen California through this key sector of our economy.

On behalf of all Californians, I encourage you to use this resource directory to learn more about our state's agricultural industries as well as the people and organizations that are crucial to their success.

Sincerely,

A handwritten signature of Arnold Schwarzenegger in black ink, written in a cursive style.

Arnold Schwarzenegger

## Foreword

California is the world's fifth largest agricultural economy. As a farmer, I'm very proud that we produce everything from milk and honey to cotton and rice; and from figs and lettuce to pistachios and walnuts. Because of this remarkable abundance, agriculture in our state must remain ever vigilant against threats from pests and diseases that could at any moment put the industry, environment and public health at great risk.

For this reason, we have devoted editorial content of the annual agricultural resource directory to the menace posed by a half-inch-long insect and the disease it carries – the glassy-winged sharpshooter and Pierce's disease. If you are unfamiliar with this small but lethal pest and disease, you may be wondering how it destroys plants. The glassy-winged sharpshooter bites into a plant's stem or leaf and transmits Pierce's disease – a bacteria that kills numerous plants, including grapevines. The effect on California's grape and wine industries is potentially catastrophic. In the face of this looming calamity, California has fought back using manpower, science and technology.

This directory contains inspiring stories of tireless efforts by local county agricultural commissioners, University of California researchers, state biologists and scientists, and members of the affected industry sectors. Since detection of this pest back in the 1990s in Southern California, these individuals have worked to identify and combat even the slightest sign of a glassy-winged sharpshooter invasion. Due to their hard work, ingenuity and commitment, we have developed greater knowledge of the foe we confront, better strategies for defeating the disease and its transmitter, and better coordination of policies at all levels of government and between the public and private sectors.

This directory also contains the most recent information and data on the performance and output of agriculture in California. When reviewing the numbers, however, it is important to keep in mind that statistics alone do not define the industry. It is also defined by innovative approaches: risk-takers who find creative ways to solve problems. California's farmers and ranchers are real visionaries, seeking new and



better ways to produce food and fiber of the highest quality and with the greatest care for the environment.

Indeed, it is the marriage between tradition and innovation that has secured California's status as the nation's most productive agricultural state for more than 50 years. Farmers and ranchers blend old-fashioned values of patience and perseverance with new technologies and advanced agricultural practices. The result is a fast-changing, adaptable industry valued at nearly \$32 billion and encompassing more than 350 plant and animal commodities.

As you use this resource directory to learn more about the impressive performance of California agriculture, I hope you'll also make time to discover some of the stories about the crops, technologies, and especially the men and women who provide your food, fiber and shelter – the people of California agriculture.

Sincerely,

A.G. Kawamura, Secretary  
California Department of Food and Agriculture

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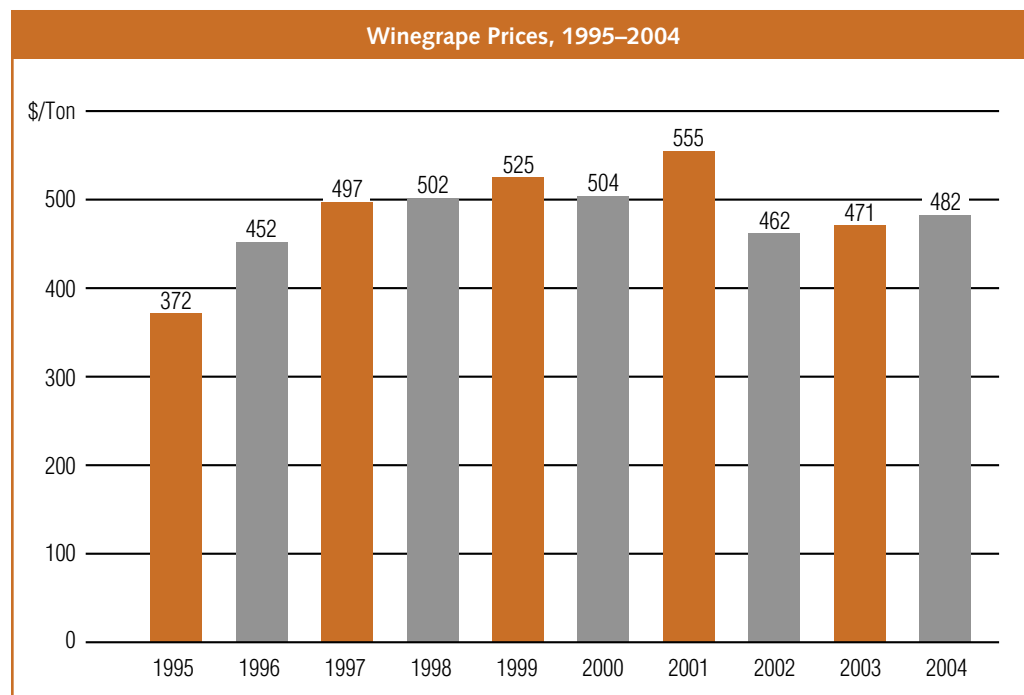


# A Glass Half Full

## California's Grape Growers, Winemakers Persevere Against Pierce's Disease and the Glassy-winged Sharpshooter

For California's grape growers and winemakers, the prosperous 1990s were years of advancement, improvement, expansion and enjoyment. The growing popularity of wine overshadowed mounting concerns about overplanting and rising land prices. For the moment, at least, the industry's cup was overflowing.

Business was good; the world, it seemed, was abuzz about the state's world-class wines. Unfortunately, by the end of the decade, it wasn't the only buzzing sound in the vineyard. The glassy-winged sharpshooter had turned up uninvited in Southern California's vineyards, and no one was quite sure just how much damage it would do.



1. California leads the nation in the production of grapes.



*Hard facts were scarce, dire predictions were rampant; any way you looked at it, the picture was not pretty.*

## Apocalypse Then?

Back in 1999, statements in the media about the looming threat of the sharpshooter and Pierce's disease were peppered with words like "doomsday" and "apocalypse." Growers and researchers in the Temecula area had connected the dots between the trespassing glassy-winged sharpshooter and the unprecedented spread of disease in local vines. The losses were significant enough to appear ominous, but the state's plant pathologists and entomologists never had an opportunity to investigate this particular combination of disease and vector. They were simply at a loss to predict the long-term impacts.

Pierce's disease had been in California for over a century, but it had only occasionally flared up. Native insects weren't particularly good at spreading the bacteria, so it hadn't drawn much attention from growers or from the agricultural research community. But this party-crasher had arrived particularly well-dressed; the glassy-winged sharpshooter's feeding and breeding habits were tailor-made for spreading Pierce's disease.

California's top crop, its postcard vineyards, its vaunted reputation for world-class winemaking – all of it had gone from prime to precarious in the time it took to harvest the year's grape crop.

Back then, someone from Wall Street would call California Department of Food and Agriculture headquarters every few days to inquire about the viability of California winemakers, bottle makers, cork importers, tourism ventures and other businesses allied

1. Grape leaf showing typical Pierce's disease symptoms.
2. Adult glassy-winged sharpshooter, *Homalodisca coagulata*.
3. Crushed grapes.

with the wine industry. Bankers, loan officers, even individual investors wanted to know if the time had come to dump that stock or call in that note. Agricultural newsletters, striving to illustrate the severity of the impending threat, cooked up images of oversized glassy-winged sharpshooters stomping across the state map or devouring wine bottles.

Behind the scenes, though, growers and agricultural officials had quietly begun setting in place the cornerstones of a statewide defense against the insect. Researchers had been dispatched to delve into the disease; funding for the work was sought and secured; arrays of insect traps were deployed and surveys were begun; data began to trickle in, and steadily the picture became clearer – not a portrait of doomsday, but rather an outline of a problem that, while daunting, might not be insurmountable.

## No Silver Bullet

As crew after crew of “bug finders” surveyed the state, the evidence began to show an apparent limitation of the infestation to Southern California. Perhaps it was just a matter of time before it spread northward, but scientists began to suggest that another factor – temperature, humidity, altitude, natural enemies, a combination of these, or maybe something else entirely – might figure into the equation. For whatever reason, much of the state had not been overrun by sharpshooters, as previously suspected, and there was a chance that the agricultural community could work together to protect those places that had not yet been infested.

## Taking the Offensive: Stories from the Frontlines

*Partners in this fight are playing a critical role in preventing economic disaster from visiting our state.*

California's vineyards, nurseries, almond orchards and citrus groves are facing a serious threat. The combination of a plant disease with no cure and a half-inch-long leafhopper called a glassy-winged sharpshooter has wrought millions of dollars of damage in just a few years. With this threat, the California Department of Food and Agriculture's core function of fighting plant and animal diseases takes on new meaning in an age defined by the rapid and global movement of goods and people.

Pierce's disease has existed for more than 100 years in the state, but until recently there was no carrier as effective in transmitting the bacteria long distances or in spreading it so rapidly.

The glassy-winged sharpshooter, first found in Ventura County 15 years ago, has spread throughout Southern California. The insect is now moving northward and threatening the heart of California's farmlands – from the Central Valley up through Napa and Sonoma counties to as far north as Mendocino.

The state's best chance to combat this pest and disease combination is with its own offensive strike: through partnerships between government, nonprofit, academic and private enterprise. Without such a coordinated approach there is a real threat that this – and waves of other pests and diseases like rare forms of avian influenza and West Nile virus – will cost the state billions in economic and social losses.

The articles that begin on page 12 provide insight into this important story. In one case, researchers are hoping to use nature to inflict heavy casualties against this pest. This is the story of Dr. David Morgan and his search for a biocontrol agent to hold the line on infestations.

While researchers work on new methods of combating the pest, our state's nursery industry and county agricultural commissioners man the frontlines of the battle. Because the glassy-winged sharpshooter has a broad range of host plants, it is known to develop huge populations on woody ornamentals that are common throughout the state. With tens of thousands of nursery shipments each year, the nurseries and local agricultural commissioners have done an impressive job of inspection and detection.

California is fortunate to have some of the nation's best minds working on the problem. Foremost among these is UC Berkeley's Dr. Alexander Purcell, whose pioneering work has gained him the deserved reputation as one of the world's top experts on Pierce's disease.



This clearer picture of the geography of the problem eventually led regulators to propose an ambitious inspection program – involving hundreds of inspectors and millions of plants annually – that has largely kept shipments of nursery plants “clean” as they move northward through the state. Unprecedented? Yes. Expensive? Certainly. But with billions of dollars worth of grapes, stone fruits and other crops at stake, the investment has proven to be worth every penny.

Another revelation came about when growers and insect trapping crews found that the sharpshooters congregated in citrus groves during the winter months, leaving them susceptible to highly targeted treatments that could significantly reduce their populations in one fell swoop. Scientists, farmers and regulators lamented the apparent lack of a “silver bullet” that could solve the entire problem. But with every discovery, every advance, every research project, the growers were gaining tools and knowledge, slowly but surely learning to live with it.



Certainly, no one involved felt a sense of ease or relief about the overall threat at the time. Rather, those most involved in the project were experiencing a gradual adjustment from the alarmist, nearly defeatist attitude that had dominated the early months of the ordeal. What took its place was an increasingly promising outlook enlightened by science, data and determination. As time passed and the situation stabilized, stakeholders generally adopted a sense that they were not just treading water, but indeed they were succeeding by buying time for research that had already provided some helpful results and might later light the way past Pierce’s disease and the glassy-winged sharpshooter.

*...the sharpshooters congregated in citrus groves during the winter months, leaving them susceptible to highly targeted treatments that could significantly reduce their populations in one fell swoop.*

1. Intensive trapping helps researchers and growers to target treatments.
2. Tiny wasps – natural enemies of the glassy-winged sharpshooter – help to control infestations.
3. Origin inspection of nursery stock to prevent movement of the glassy-winged sharpshooter.

## Buying Time With Biocontrol

Soon after the statewide program began, scientists determined that one viable method of limiting the spread of the sharpshooter was biocontrol, an approach that relies on introducing a pest's natural enemies as a means of reducing its population. Trips to the sharpshooter's native range, in northern Mexico and the gulf states, gave scientists a few species of parasitic wasps to work with. The wasps help control the pests by laying their own eggs inside egg masses laid by the sharpshooters. The emerging wasps devour the sharpshooter eggs as their first meal.

The wasps are regularly released at several sites throughout Southern California, and limited releases are also carried out in other areas where sharpshooter populations spike or where newer infestations have been detected. Researchers returning to the release sites in subsequent seasons have been able to collect the wasps' descendants, indicating that the wasp colonies are surviving in the wild. The detection of a great many parasitized egg masses also shows that the biocontrol project has helped reduce the population of sharpshooters significantly.

## Fast-forward

Progress of the statewide Pierce's Disease Control Program has exceeded expectations. The anxiety during the program's fitful first months back in 1999 has given way to a confident, consistent, positive attitude. The threat of Pierce's disease is still very real, and the stakes are about as high as they could be when it comes to California agriculture.

But well over 100 research projects have been funded; growers in infested areas have gained the knowledge necessary to impose a degree of control over the pest; many of the vineyards lost in Temecula back in 1999 and 2000 have been replanted; and at-risk crops elsewhere in the state remain largely free from the glassy-winged sharpshooter. This progress is due to an exemplary program that has brought growers, scientists, agricultural officials and their communities together in cooperative pursuit of a solution.



In mid-2005, the state's winegrape growers provided perhaps the clearest indication to date that the statewide program is succeeding. They voted overwhelmingly to continue an annual assessment on their crop sales to fund research into Pierce's disease and the glassy-winged sharpshooter. With that ballot, the growers did more than pay for research; they also sent a very valuable message to their leaders in Congress and the state legislature – and to consumers – that the farmers are behind this effort, they're in it for the long haul, and they are ready and willing to participate financially in finding a solution.

## Apocalypse Now? No.

The apocalypse has not come to pass in California's vineyards, despite the early doom-and-gloom predictions. In fact, those involved in the statewide program generally agree that the biggest threat these days is not the sharpshooter, but the complacency that might tend to creep in after more than five years of relative success and increasing confidence. But the threat remains, and so must the vigilance remain as high as ever.

Researchers say that a solution to Pierce's disease is still at least several years away, so this story has not reached its end. Around here, though, you don't hear words like "doomsday" anymore. Unless maybe you're a sharpshooter.

# Profile

## Dr. David Morgan: A General of Science Directing an Army of Parasites

To the layperson, the idea might seem unusual: Go to a place with a major infestation of a dangerous exotic pest and set out to raise more of them. But for scientists fighting the glassy-winged sharpshooter, this approach makes perfect sense. The reason is simple, these researchers are also rearing parasites that consume sharpshooter egg masses, and there are inherent advantages in being steps away from the pest they are working to suppress.

This is a story that the California Department of Food and Agriculture and the U.S. Department of Agriculture are writing together. The agencies are partners in a rearing operation near Arvin, on the far southern edge of the Central Valley. The facility, which features a splendid view of the changing topography between the valley and the Tehachapi mountain range, is in a corner of Kern County that has seen heavy populations of glassy-winged sharpshooters.

The parasites are the real point of this project and they happen to be wasps. Tiny ones: So small they appear to be specks of dust to the naked eye. Under a microscope, though, it is clear that this natural enemy of the sharpshooter is indeed a wasp. This particular weapon in the arsenal is not interested in stinging humans – definitely an additional benefit. The Arvin rearing facility is important to the project since California is not their native habitat. The wasps must be imported and carefully tended to before they are turned loose.

These parasitic wasps are the foot soldiers in a war that the Pierce's Disease Control Program hopes will both inflict heavy casualties on the sharpshooters while also buying time for other scientists to find a cure for the disease.



"We're dealing with an insect, the sharpshooter, that is a vector of a disease," said Dr. David Morgan, who is the lead scientist at Arvin and its sister research facility in Riverside County. "You have to knock down the population of the vector enormously to actually reduce transmission of the disease."

In order for the rearing facility to produce wasps, it must first develop the environment required for the parasites to thrive. The first step comes in a greenhouse: Plants are raised as hosts for glassy-winged sharpshooters to feed and lay their eggs. Some of the eggs are collected for future research and the rest are used for the wasps, which lay their own eggs within the sharpshooter egg masses. Emerging wasps consume the sharpshooter eggs and then disperse and mate, searching out more sharpshooter eggs to parasitize.

Success of the Arvin operation at producing the right environment for rearing these tiny wasps extends beyond the confines of the property. "We provide

---

1. Dr. Morgan at work to introduce an effective biological control for the glassy-winged sharpshooter.

plants, we provide sharpshooters and we provide wasps to researchers who are also looking for ways of controlling the glassy-winged sharpshooter," said Dr. Morgan. "That is increasingly becoming our responsibility, which we are very proud."

Packages of these materials have been sent as far as Russia, Florida, Texas and North Dakota as well as to researchers with the U.S. Department of Agriculture and University of California. Research projects are all aimed at improving sharpshooter control strategies, including studies of insect behavior, insecticide trails, genetic analysis, disease transmission, and impacts on host plants.

Not surprising, the fact that the facility produces wasps for release into the environment tends to fire the imagination of the news media, which has shown substantial interest in the program. However, just seeing the wasps is a gigantic challenge for photographers. "When we first started we had *60 Minutes* come out with a big TV camera," said Dr. Morgan. "And, the cameraman kept banging his lens against the vial trying to get the wasps in focus." The releases may seem dramatic in the abstract, but they are no more elaborate than a researcher walking into a field and opening a small plastic vial the size of a film canister.

Since the program began nearly six years ago, five different wasps have been imported and reared for release in California. The first, *Gonatocerus triguttatus*, was introduced in 2000. The next two, *Gonatocerus ashmeadi* and *Gonatocerus morrilli*, released in 2001, are actually native wasps. However, they parasitize smoke tree sharpshooters in California, so scientists brought in specimens from elsewhere in an attempt to introduce new genes that might, over time, direct more of the natives to glassy-winged sharpshooters. In 2003, *Gonatocerus fasciatus* was released, followed by the release of *Anagrus epos* in 2005.

*Anagrus epos* represents a new frontier for the program. The wasp is native to Minnesota and active in winter. Therefore, it is believed the parasite will be successful in California during the early spring. If so, that would establish wasps to parasitize all life cycles of the glassy-winged sharpshooter year-round, an important goal.

An objective assessment of the parasitic wasp program to this point would likely conclude that significant progress is being made and acknowledge that there is still ground to cover before declaring the project an unqualified success. An accepted scientific benchmark is to find wasps in an area two years after introduction; at which point "you can put your hand on your heart and say we have this insect in California as a good biological control agent," said Dr. Morgan. So far, the heartiest of the exotic wasps introduced here has been *Gonatocerus triguttatus*, which has been found up to a year following introduction.

So there is more work to do at the out-of-the-way spot near Arvin: more studies of parasites, more conferring with fellow scientists, more plants to grow, more wasps to rear, more glassy-winged sharpshooters to introduce to tiny controlled environments in the midst of infestations just outside.

As for entomological security at the site, there is plenty: insects are reared in cages, which are placed in screened-off rooms within screened-off greenhouses. Any openings in the greenhouses are sealed. Further, all plants around the perimeter are treated with insecticide. It turns out that the greater concern is with insects getting in. The tiny environments must be pristine. So far, so good.

# Profile

## The Nursery Industry: A First-Person Look from the Frontlines of Battle

It is another clear day in the Ventura County interior: A mid-summer morning with all the warmth of the sun already beginning to shine through. At the Valley Crest Tree Company near Fillmore, production manager Brad Bowers steers his red pickup truck to a corner of the 290-acre property and climbs out, motioning in the direction of a small number of saplings lying on their side.

In effect, the young trees are like lab rats: They are infested with glassy-winged sharpshooter egg masses. The trees will be shipped by Valley Crest and accepted by agricultural inspectors at their destination. It is all part of a pilot project designed to ease restrictions on nursery-shipping channels between southern and northern California.

"The last four years have been pretty tough in that regard," said Bowers. Valley Crest, like some other Southern California nurseries, has stopped shipping many trees and plants north for seven months out of the year – the warmer months – because the time necessary to search for egg masses is cost prohibitive. To meticulously comb over a single large tree, a two-man crew would need three-to-four hours. The workers would be required to inspect each leaf, top and bottom. And if they miss even a single egg mass, then not only

would the tree be rejected but so would the entire shipment. As a result, the nursery elected to back away from millions in annual sales. "We'd like to get a portion of that back," said Bowers.

Whether that occurs depends, in part, on the outcome of the pilot project. The main components of which include Valley Crest crews identifying trees with egg masses, isolating them, and treating them with pesticides before shipping to San Joaquin County where they are isolated again. They remain in isolation for the time it takes juveniles to hatch, with the premise that the pesticide treatment will kill the sharpshooters as they emerge. How many will die? All of them, hopefully.

Studies by UC Riverside researchers in controlled environments indicate a 99 percent to 100 percent kill ratio is possible. It all comes down to whether that kill ratio can be duplicated in the field. Success would mean that inspectors would no longer automatically reject shipments with glassy-winged sharpshooter egg masses.

It is no accident that nurseries are a focal point of the program. It's a cold fact that plant shipments are a major vehicle for spread of the glassy-winged sharpshooter, not to mention other pests and plant diseases. So, nursery operators throughout California are asked to shoulder significant responsibility of ensuring that their shipments are clean. A great deal of agriculture in this state depends on this vigilance. That said, it also must be pointed out that the nursery industry is doing an outstanding job in a general way and, specifically, with containment of the glassy-winged sharpshooter.

When the damage done and the threat posed by the sharpshooter and Pierce's disease became fully understood, the California Department of Food and Agriculture – in partnership with the U.S. Department of Agriculture and other public and private sectors – acted quickly to

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1. Valley Crest property near Fillmore.

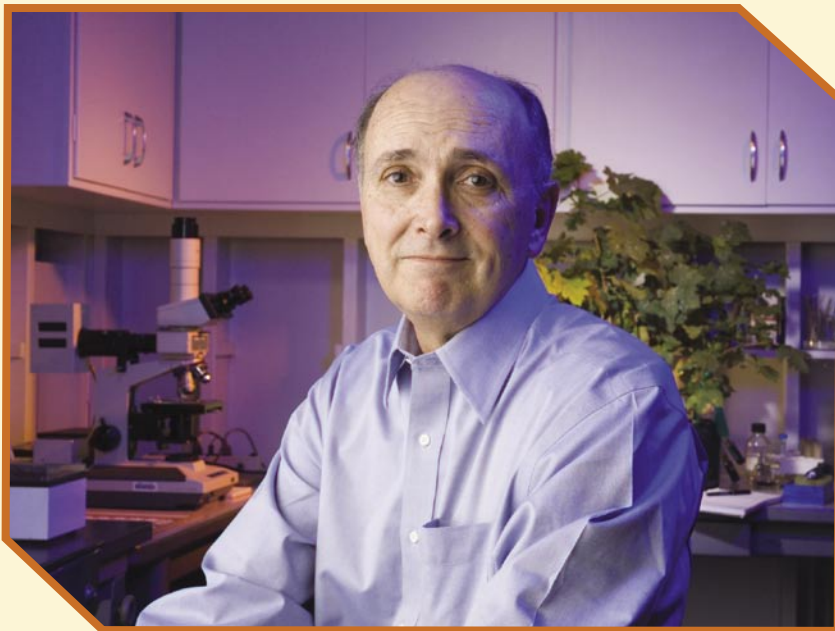
# Profile

## The Warrior Researcher: Dr. Alexander Purcell and the Fight Against Pierce's Disease

As a graduate student at UC Davis, Alexander Purcell says that he was initially totally naïve about Pierce's disease in grapevines. Yet, after being introduced to the topic, he became intensely interested in this agricultural plague and continued to work on it after becoming a faculty member at UC Berkeley. Over the ensuing decades, Purcell has established himself as one of the world's top experts on this devastating and still mysterious infection.

Influenced by mentors at UC Davis who had discovered the bacterium associated with Pierce's disease, Purcell came to the conclusion in his doctoral research that only Pierce infections in grapevines that occurred during March to June established a chronic form of the disease and that most vines infected later recovered. Because no one could culture the Pierce's disease bacterium at the time, his controversial hypothesis was difficult to prove. Yet, technology eventually caught up with Purcell's cutting-edge thinking, and when a media to culture the bacterium was developed, his theory was supported. Purcell has continued to push the research envelope throughout his impressive academic career that includes his present position as professor of entomology at UC Berkeley, where he also served as department chair in the 1990s.

Thinking outside the box is essential in battling Pierce's disease because many conventional treatments are ineffective. Purcell explains that unlike other bacterial plant diseases, *Xylella fastidiosa*, the bacterium that causes Pierce's disease, "lives in a protected environment in the plant where it spreads systematically before it produces disease symptoms, so chemical pesticides to kill or prophylactically prevent the establishment of the infection is very difficult." Despite the obstacles,



however, Purcell says that advances are being made in combating the disease.

Given his finding that the March-June window is the critical infection period, Purcell emphasizes that "management of riparian vegetation can drastically reduce the numbers of blue-green sharpshooters entering vineyards in the critical spring months while also improving the quality of riparian vegetation near vineyards." This management, he explains, "Involves removing plant species that are highly attractive to the blue-green sharpshooter during spring months and replacing them with native riparian species that are not attractive so as to establish a riparian woodland setting as soon as possible." In addition, grape varieties that are highly susceptible to Pierce's disease, such as pinot noir and chardonnay, should not be planted near riparian areas that are rife with the disease.

While the spring months are the most dangerous, Purcell reminds growers that the glassy-winged

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1. Dr. Purcell is pushing the research envelope at his UC Berkeley lab.

establish a plan to minimize spread of the insect while researchers race to find a cure for Pierce's disease.

Five years into the program and the line against the sharpshooter is holding. While spot infestations have surfaced in regions around the state, the area that is regarded as generally infested is unchanged. Who gets credit for that? The nursery industry.

"As I travel the state talking about our program, I can tell you there is universal appreciation for what the nurseries have accomplished," said statewide coordinator Bob Wynn. "Working with our county agricultural commissioners, the nurseries are committed to stopping the spread of this pest." Just look at the numbers. They speak for themselves."

Each year, tens of thousands of nursery shipments move between southern and northern California. Within the program's first five years, more than 250,000 shipments have traveled that route. According to inspection records at points of origin, more than 99.97 percent of those shipments have been clean.

Heading the list of grateful agricultural sectors is the wine industry. Even though Pierce's disease threatens other crops, wine is the most vulnerable and highest profile commodity at risk. After Pierce's disease severely

damaged vineyards in the Temecula area, grape growers came together to help fund a wide variety of research projects through an assessment on production. During the first four years of the assessment program, \$17.8 million was raised for research. In 2005, growers voted on the program again, this time to extend it through 2011.

Circumstances being what they are, the wine and nursery industries have emerged as partners in the fight against the glassy-winged sharpshooter and Pierce's disease. Vintners and grape growers pay very close attention to news on nursery shipments, and the nursery operators understand that impacts on wineries will be a huge consideration before any changes occur in protocol for shipments.

So, if there comes a point in time when the pilot project is generally accepted, the wine industry will have a lot to say about it. At Valley Crest Tree Company, Brad Bowers says they understand that very well and they have a lot of respect for the challenges faced by the wine industry.

"We understand that they're very protective and that they want this done," said Bowers. "We think there's a world where we can both co-exist and get back to business the way it used to be."

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**Dr. Alexander Purcell** *continued from page 15*

sharpshooter "can transmit *Xylella* to dormant grapevines in the winter." "Thus growers," warns Purcell, "should prevent winter activity of the glassy-winged sharpshooter in their vineyards." Winter weather, however, does play a role in curbing the spread of Pierce's disease.

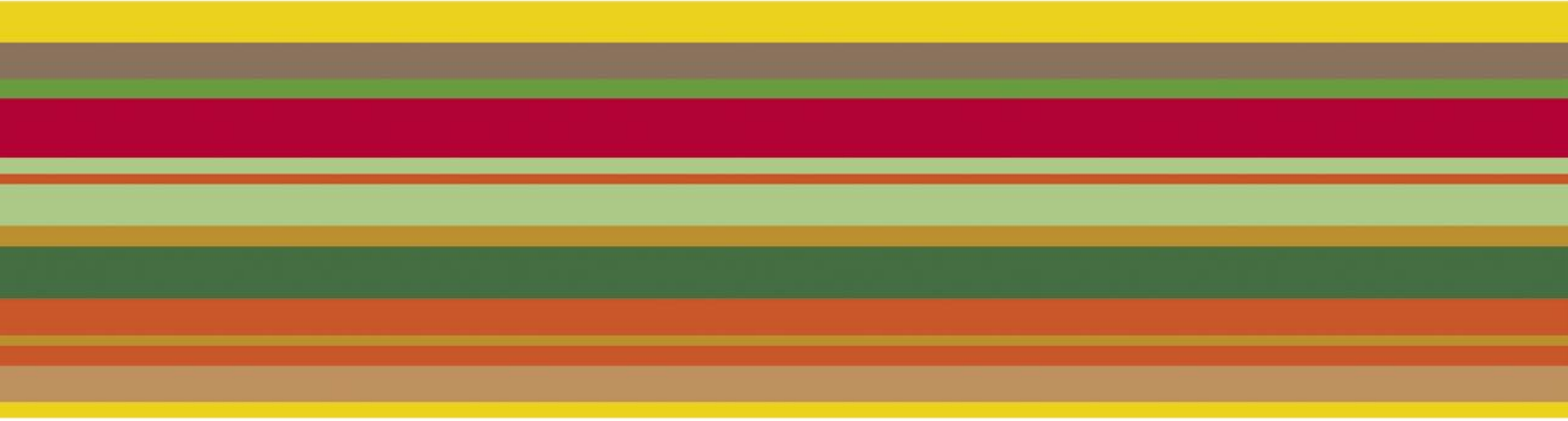
"Freezing can be therapeutic for grapevines," he says. Further, "winter cold severity seems to explain the geographical limits of Pierce's disease." Purcell says, however, "Freezing alone clearly does not eliminate the bacterium; the plant appears to do that after freezing exposures." "Maybe," he conjectures, "we can cause plants to produce the same response using another trigger other than freezing."

Another encouraging avenue is the breeding of grape varieties that are resistant to the disease. Purcell says: "Many wild grape species are very tolerant of *Xylella* infections and have no or very mild symptoms. These are being used to breed tolerant or resistant new grape varieties that have high quality fruit for table, raisin or wine uses. ...This work has to continue," he notes, "because it takes many years to produce a final product, but when it does, the benefits accrue year after

year with no further cost inputs."

Despite the challenges, Purcell praises the efforts of industry and government to defeat Pierce's disease. "I'm very impressed," he says, "by the wine industry's response to financially support research and backing of the California Department of Food and Agriculture's programs to contain the glassy-winged sharpshooter." He observes that the industry's research support occurred even before Pierce's disease became a prominent statewide issue because of the glassy-winged sharpshooter. He also commends the citrus industry for supporting research and control "far beyond what they might reasonably be expected to do." He singles out the area-wide control program in Kern and Tulare counties for developing a successful approach to the disease and its insect carrier "which is a great way to go, the only alternative in my opinion."

In the end, says Purcell, "The research and preventive control investments may seem large statewide, but they are very good investments in the future of the industries involved." "Relative to the value of potential losses," he points out, "the investments are just good business." The bottom line: "My advice is to stay the course."



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